A REMEDIAL ACTION PROGRAM
NEW BEDFORD HARBOR
SUPERFUND SITE

PRESENTED TO:

THE GREATER NEW BEDFORD AREA

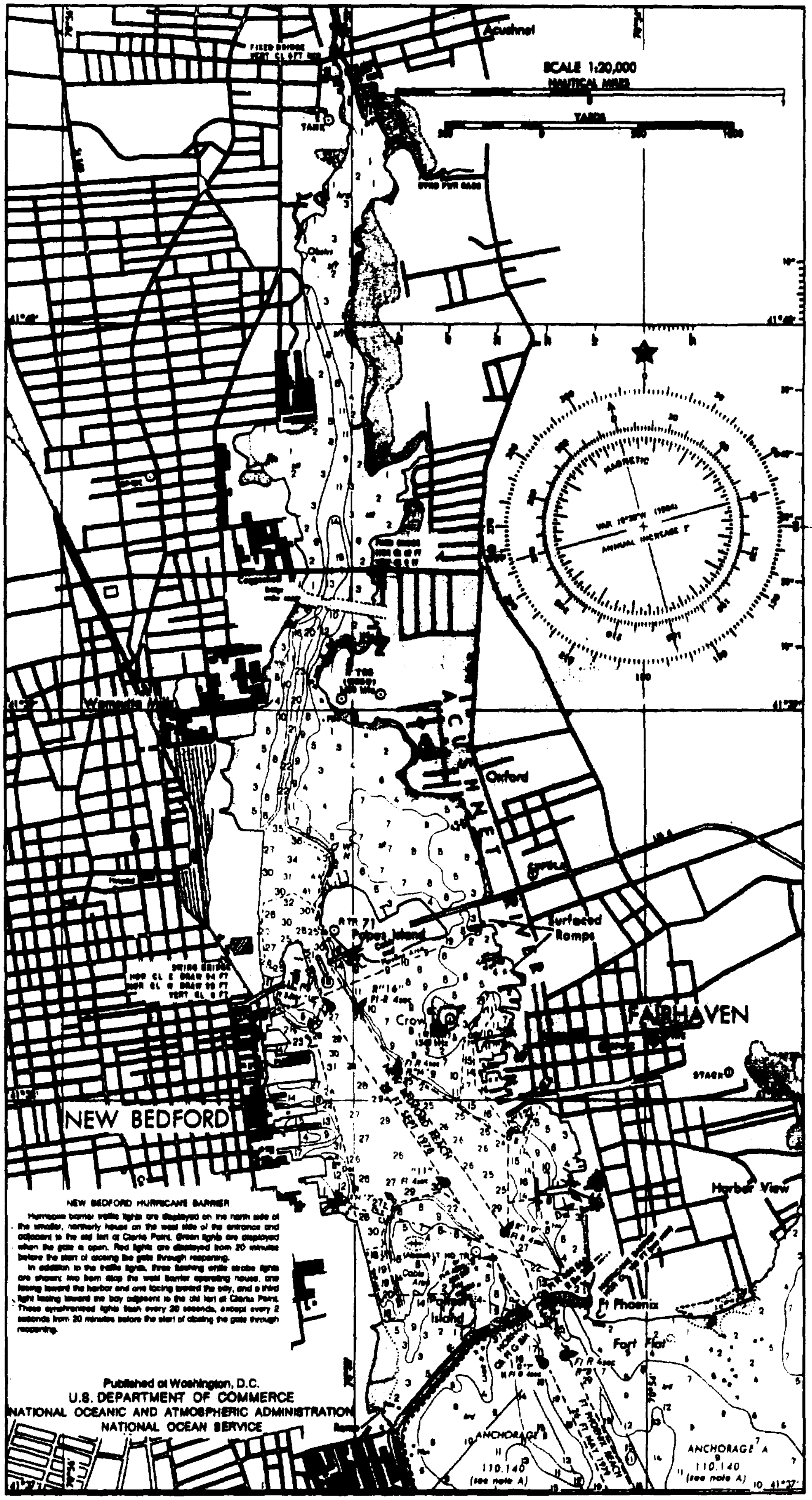
AUGUST 22, 1989

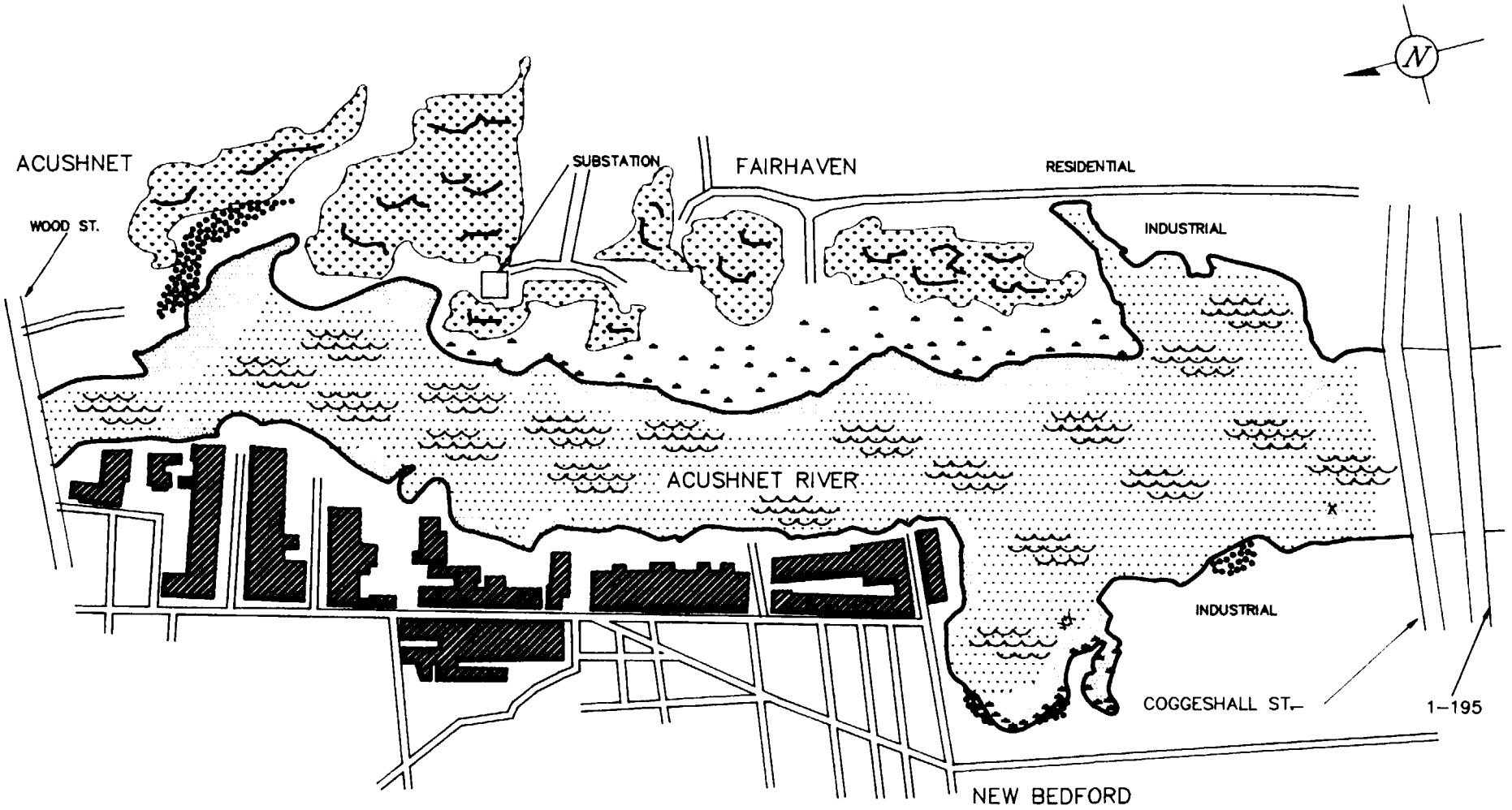
(2038)

REMEDIAL ACTION PROGRAM GOALS

- PROTECT HUMAN HEALTH AND THE ENVIRONMENT
- PROTECT ENVIRONMENTAL RESOURCES
- MINIMIZE SITE DISTURBANCE AND CONTAMINANT RELEASE
- COST EFFECTIVE
- CONSISTENT WITH LEGAL REQUIREMENTS
- PROVEN TECHNOLOGY WITH RAPID IMPLEMENTATION

(2038)


Acushnet
SCALE 1:20,000
NAUTICAL MILES
YARDS
ACUSHNET
Oxford
Surfaced Ramps
Popes Island
Crow
FAIRHAVEN
NEW BEDFORD
Harbor View
Ft Phoenix
Fort Flat
Palmer Island
ANCHORAGE B
110.140
(see note A)
ANCHORAGE A
110.140
(see note A)
NEW BEDFORD HURRICANE BARRIER
Hurricane barrier traffic lights are displayed on the north side of the smaller, northerly house on the west side of the entrance and adjacent to the old fort at Clarks Point. Green lights are displayed when the gate is open. Red lights are displayed from 20 minutes before the start of closing the gate through reopening.
In addition to the traffic lights, three flashing white strobe lights are shown: two from atop the west barrier operating house, one facing toward the harbor and one facing toward the city, and a third light facing toward the bay adjacent to the old fort at Clarks Point. These synchronized lights flash every 20 seconds, except every 2 seconds from 20 minutes before the start of closing the gate through reopening.
Published at Washington, D.C.
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE



HABITAT TYPES

= SALT MARSH

= PHRAGMITES

= TIDAL FLAT (MEAN LOW WATER–MEAN SEA LEVEL)

= WATER COVERAGE (AT MEAN LOW WATER)

X X = ROCKS

EXISTING HABITATS

0' 500' 1000' 1500'

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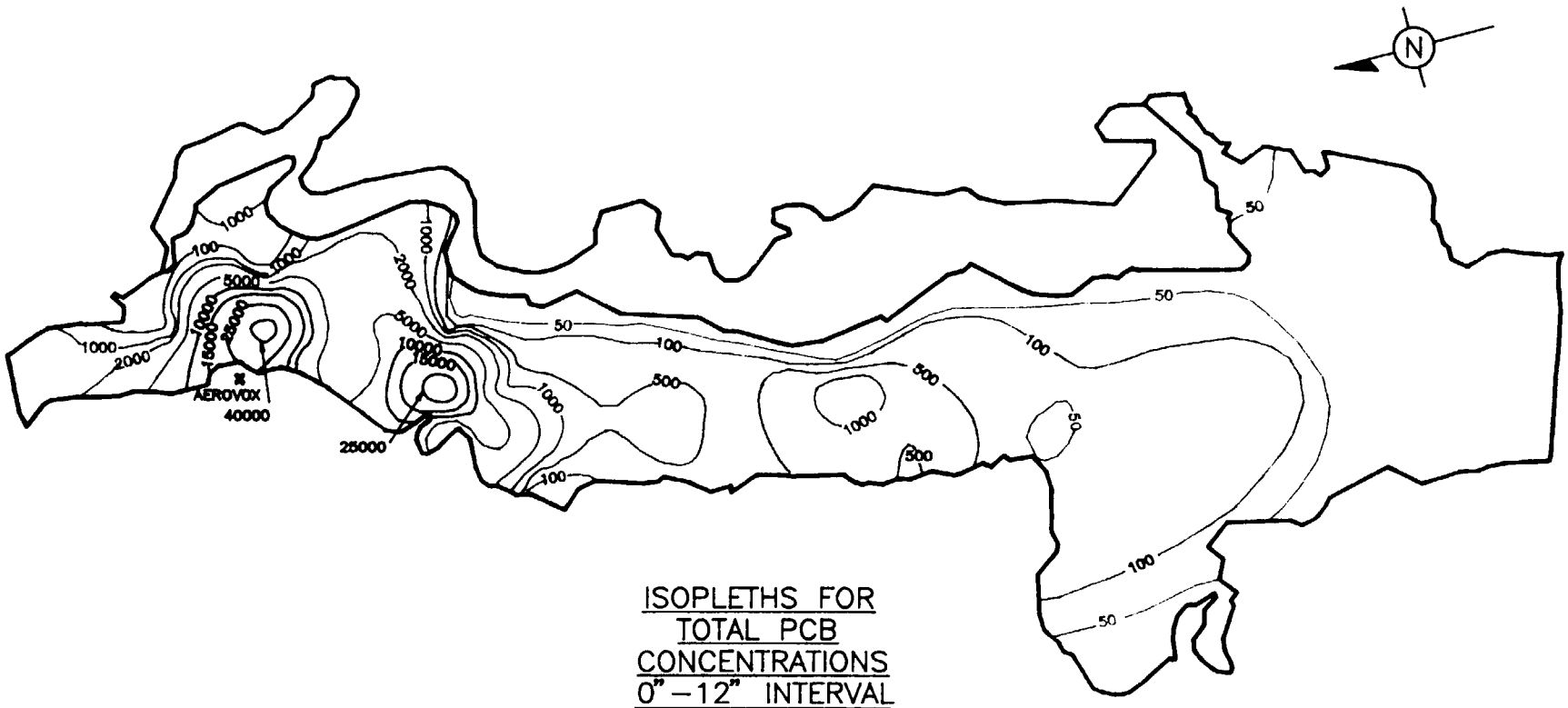
OH6002N 1"=900'



ISOPLETHS FOR TOTAL PCB CONCENTRATIONS 0" – 12" INTERVAL

LEGEND

100 = TOTAL PCB CONCENTRATION ISOPLETH (PPM)

0' 500' 1000' 1500'

NOTES:

1. ISOPLETHS DEVELOPED USING KRIGING & DATA FROM UNITED STATES ARMY CORPS OF ENGINEERS (AUGUST–OCTOBER, 1985 AND AUGUST 1987) AND BATTELLE/NUS (JUNE, 1985)

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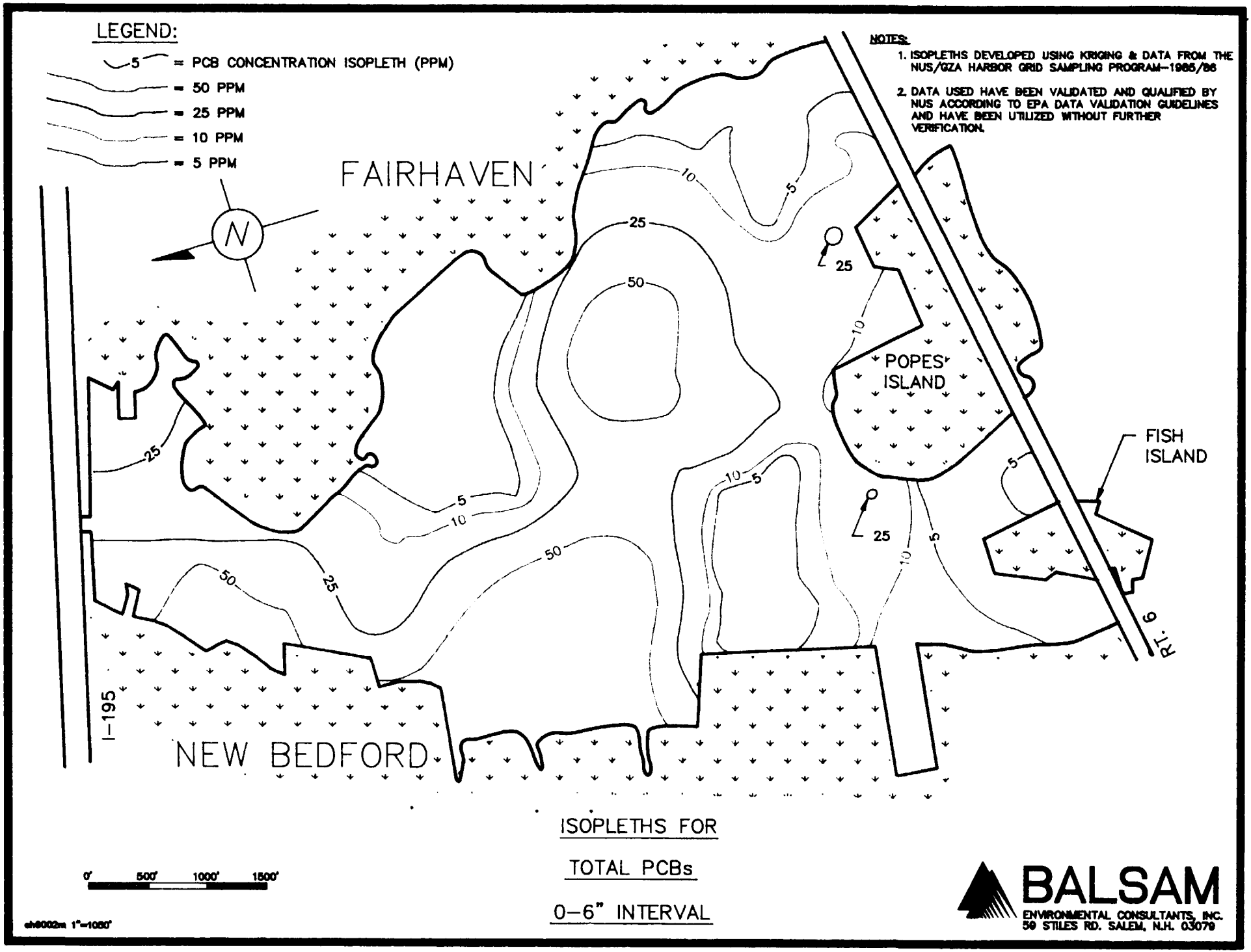

ISOPLETHS FOR

TOTAL PCBs

0-6" INTERVAL

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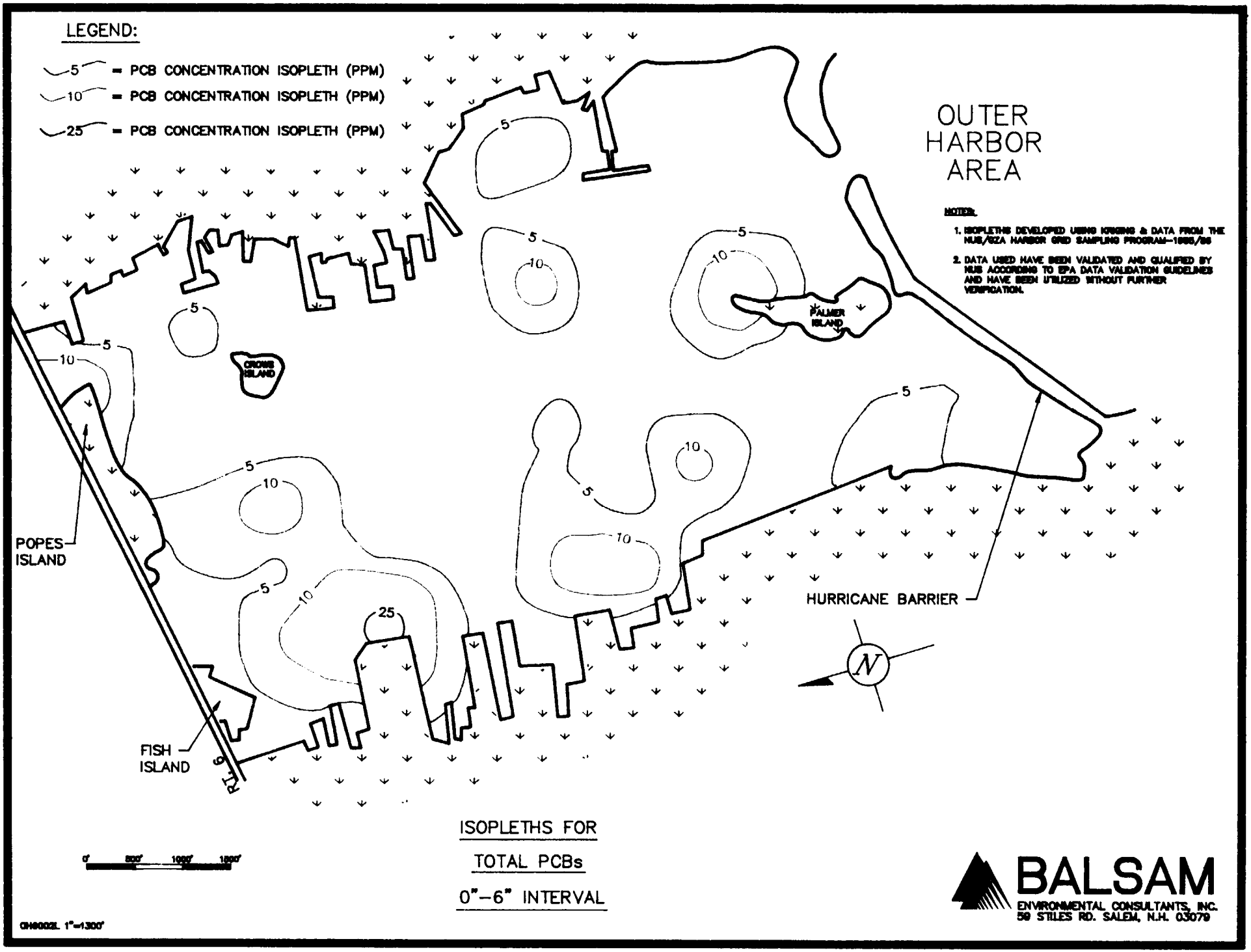
LEGEND:
5 = PCB CONCENTRATION ISOPLETH (PPM)
10 = PCB CONCENTRATION ISOPLETH (PPM)
25 = PCB CONCENTRATION ISOPLETH (PPM)
OUTER HARBOR AREA
NOTES:
1. ISOPLETHS DEVELOPED USING KRIGING & DATA FROM THE NUS/EZA HARBOR GRID SAMPLING PROGRAM-1985/86
2. DATA USED HAVE BEEN VALIDATED AND QUALIFIED BY NUS ACCORDING TO EPA DATA VALIDATION GUIDELINES AND HAVE BEEN UTILIZED WITHOUT FURTHER VERIFICATION.
PALMER ISLAND
CROWE ISLAND
POPES ISLAND
FISH ISLAND
RT. 9
HURRICANE BARRIER
N
0' 800' 1600' 2400'
ISOPLETHS FOR
TOTAL PCBs
0"-6" INTERVAL
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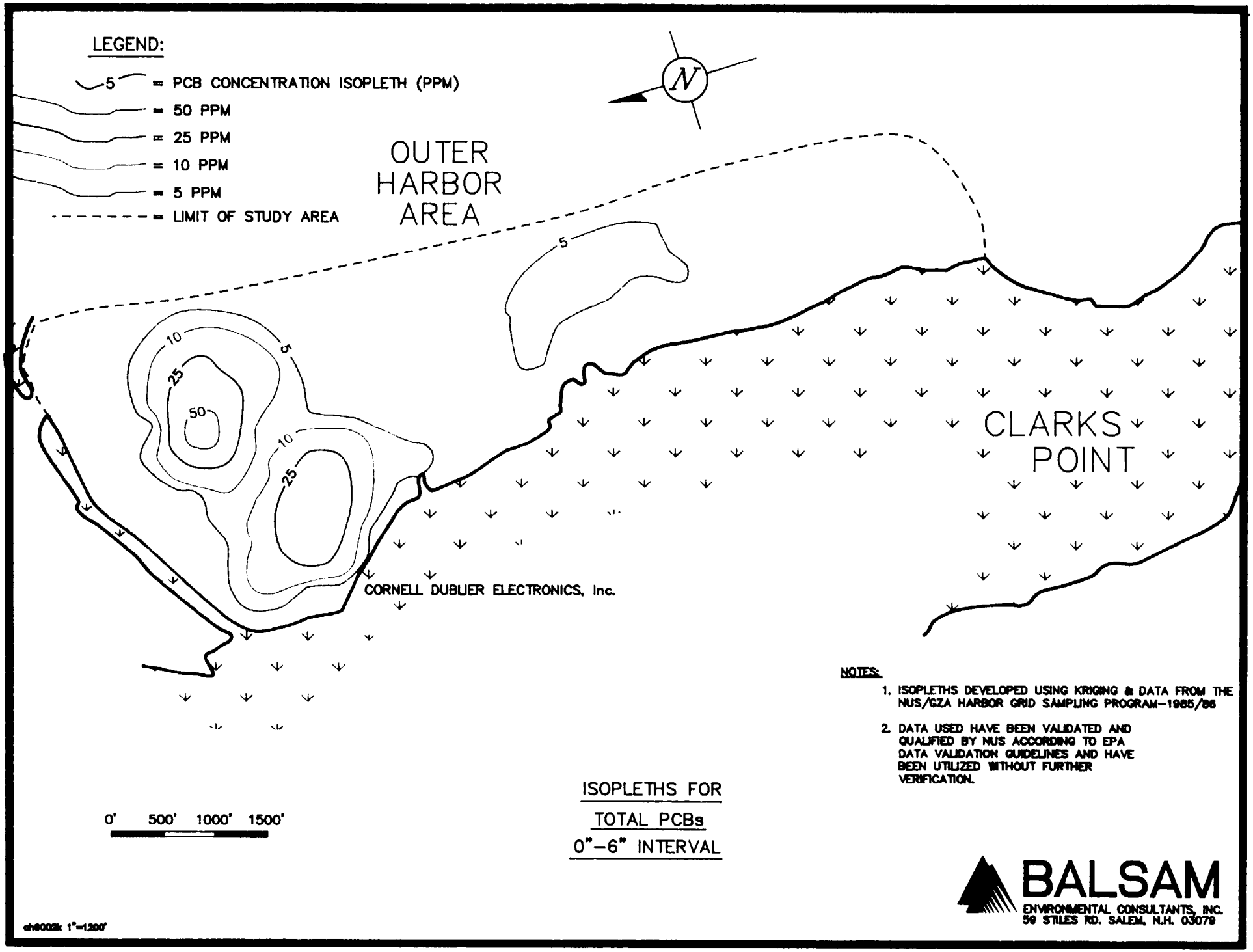
CH6002L 1"=1300'


LEGEND:
5 = PCB CONCENTRATION ISOPLETH (PPM)
= 50 PPM
= 25 PPM
= 10 PPM
= 5 PPM
= LIMIT OF STUDY AREA
N
OUTER HARBOR AREA
CLARKS POINT
CORNELL DUBLIER ELECTRONICS, Inc.
0' 500' 1000' 1500'
NOTES:
1. ISOPLETHS DEVELOPED USING KRIGING & DATA FROM THE NUS/GZA HARBOR GRID SAMPLING PROGRAM-1985/86
2. DATA USED HAVE BEEN VALIDATED AND QUALIFIED BY NUS ACCORDING TO EPA DATA VALIDATION GUIDELINES AND HAVE BEEN UTILIZED WITHOUT FURTHER VERIFICATION.
ISOPLETHS FOR
TOTAL PCBs
0"-6" INTERVAL
BALSAM
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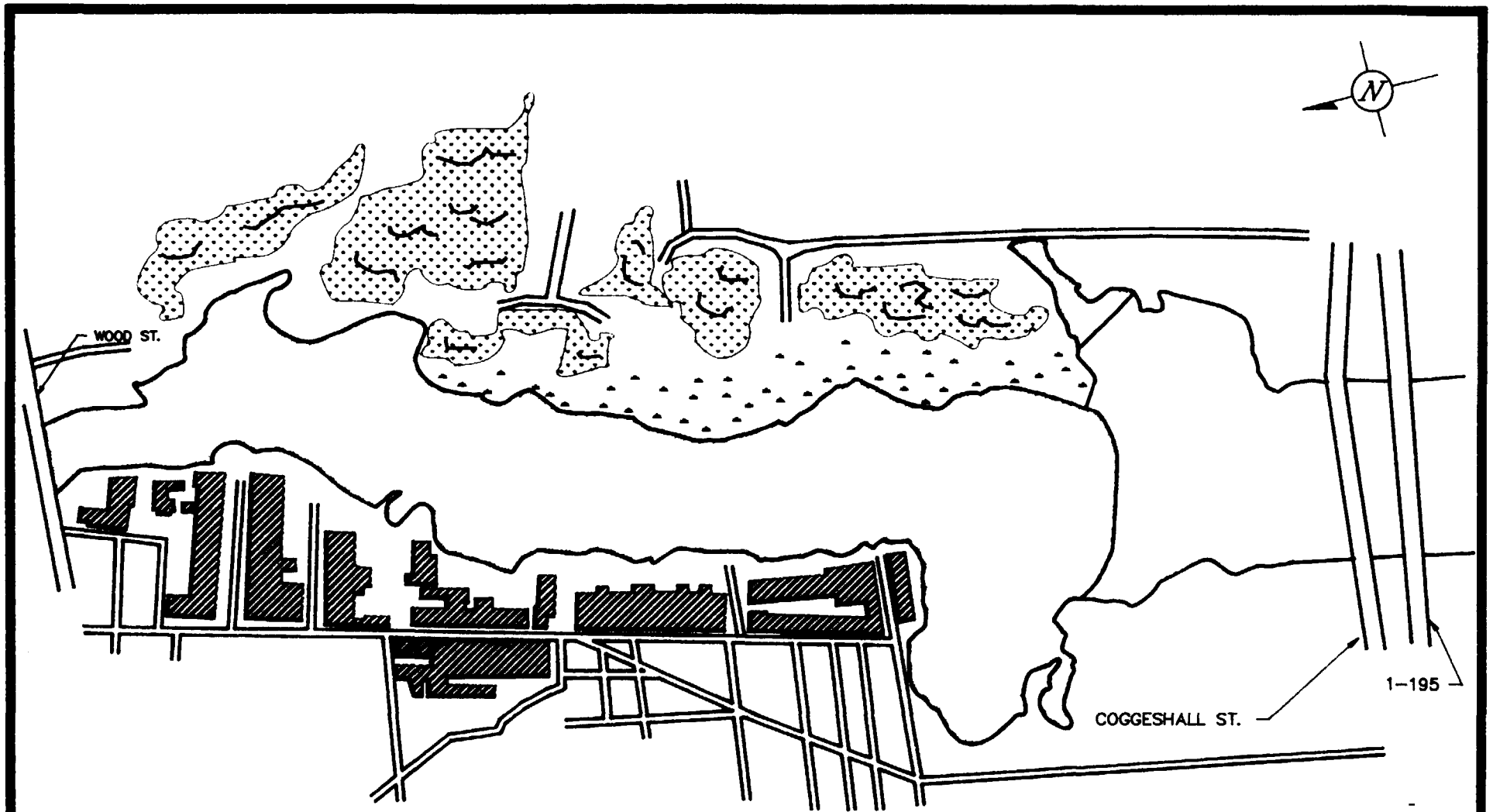
59 STILES RD. SALEM, N.H. 03079
ch6002k 1"=1200'

REMEDIAL PROGRAM COMPONENTS

- HYDRAULIC CONTROLS
- GEOFABRIC INSTALLATION
- SEDIMENT CAP PLACEMENT
- ARMORED CAP PLACEMENT
- PLANT NEW SALT MARSH
- INITIATE MONITORING PROGRAM



CAP EXTENT

0' 500' 1000' 1500'

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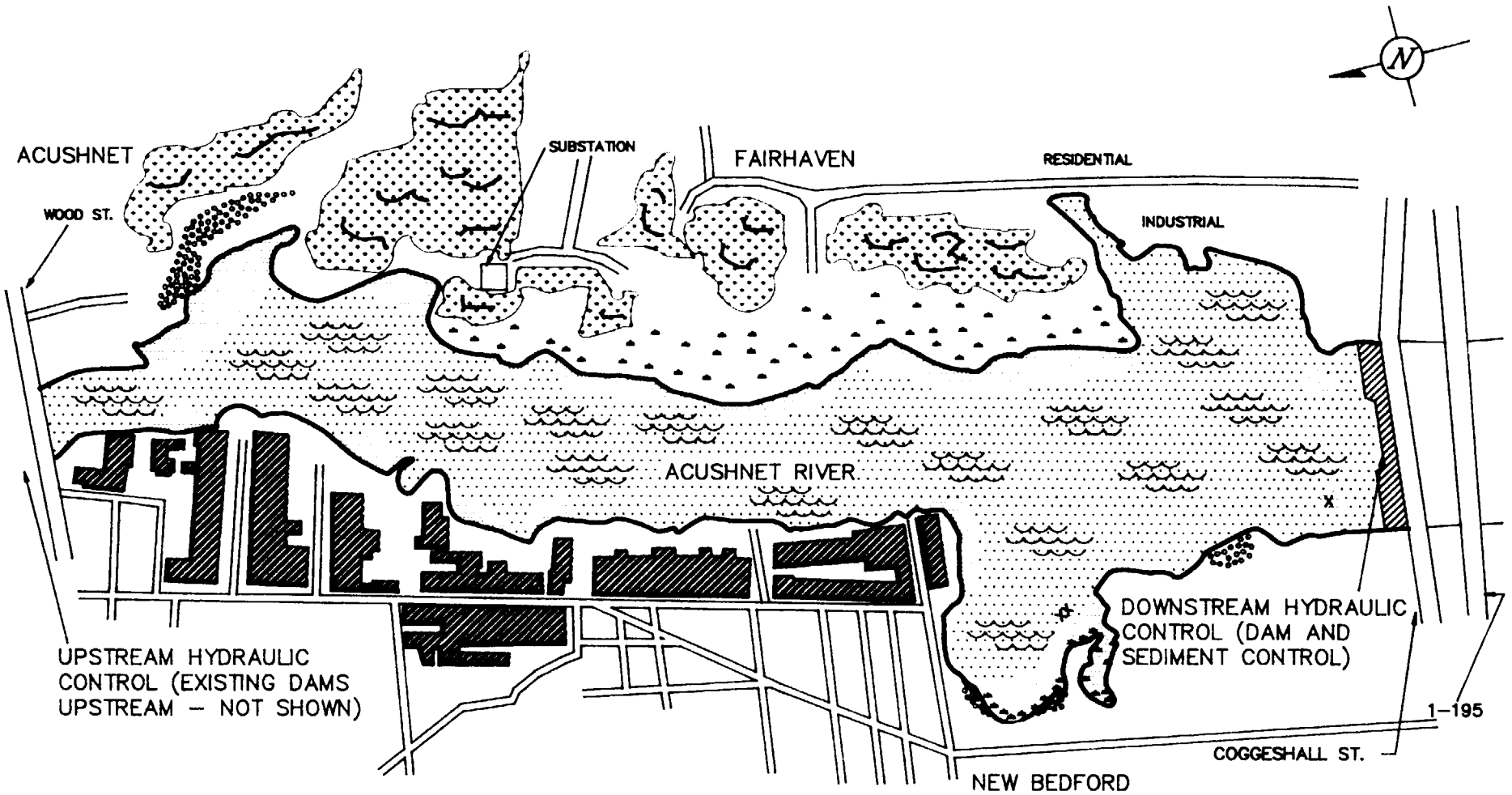
ch6002b 1"=900'



HABITAT TYPES

= SALT MARSH

= PHRAGMITES

= TIDAL FLAT (MEAN LOW WATER--MEAN SEA LEVEL)

= WATER COVERAGE (AT MEAN LOW WATER)

x x = ROCKS

HYDRAULIC CONTROLS

0' 500' 1000' 1500'

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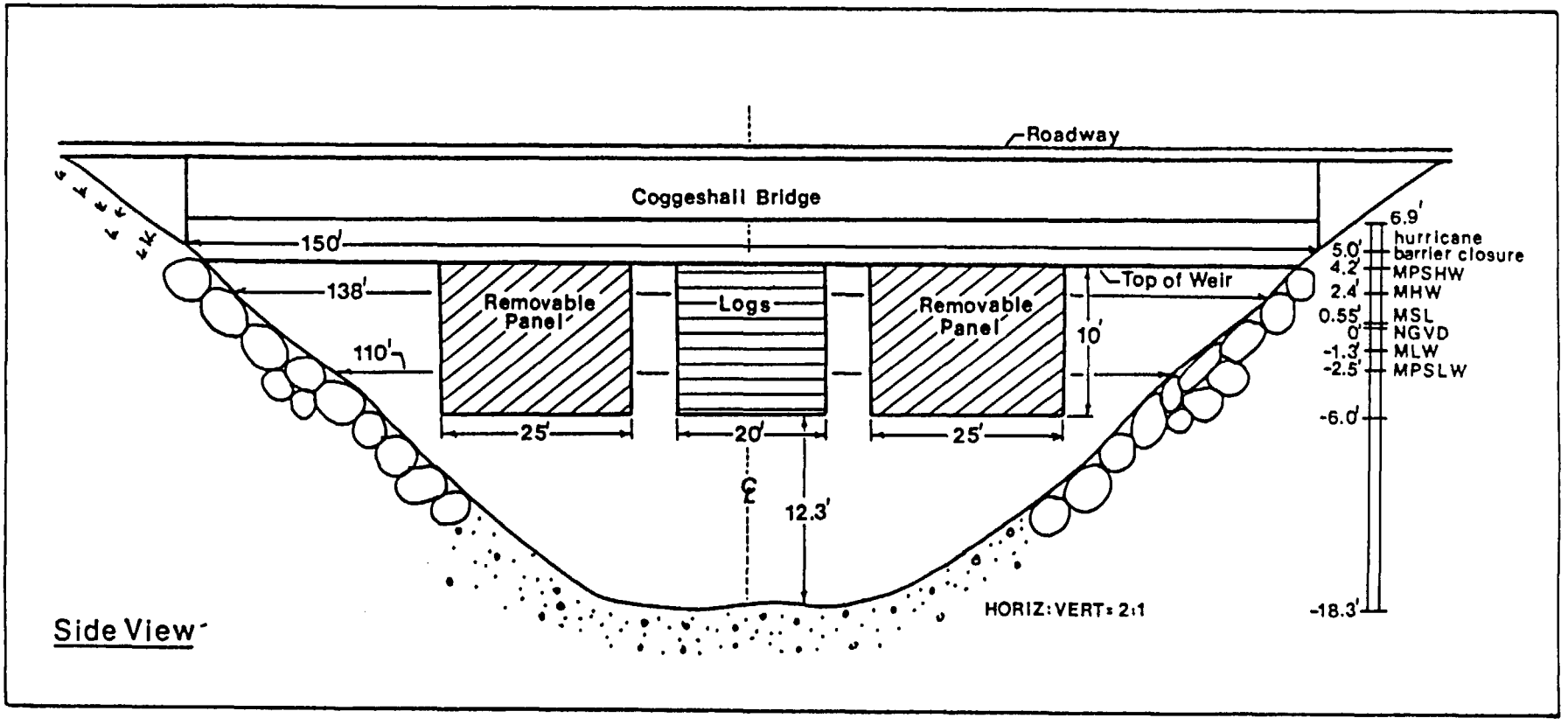
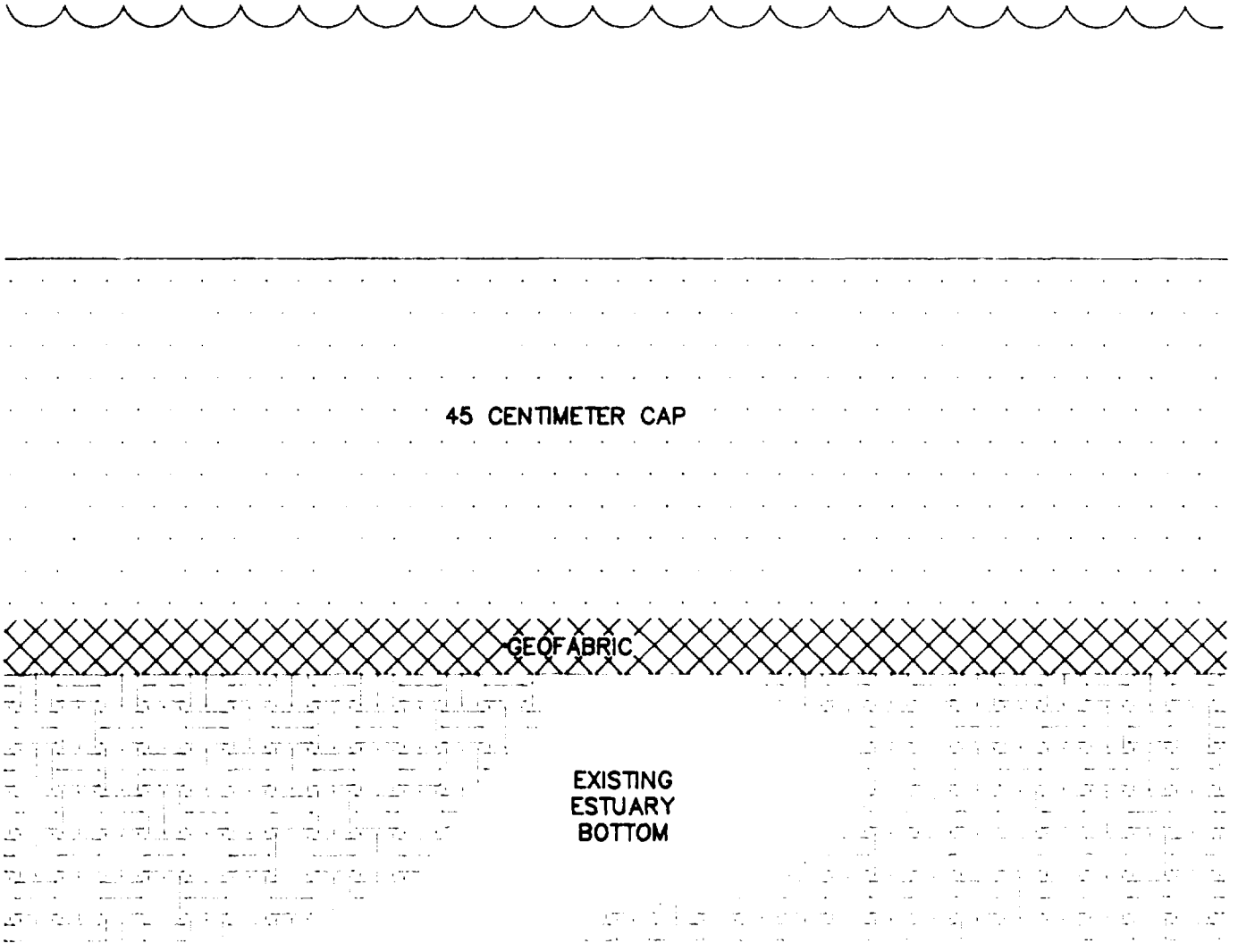
ch6002j 1"=900'



Side and plan views of the proposed dam with adjustable weir.

TYPICAL CAP

CROSS SECTION



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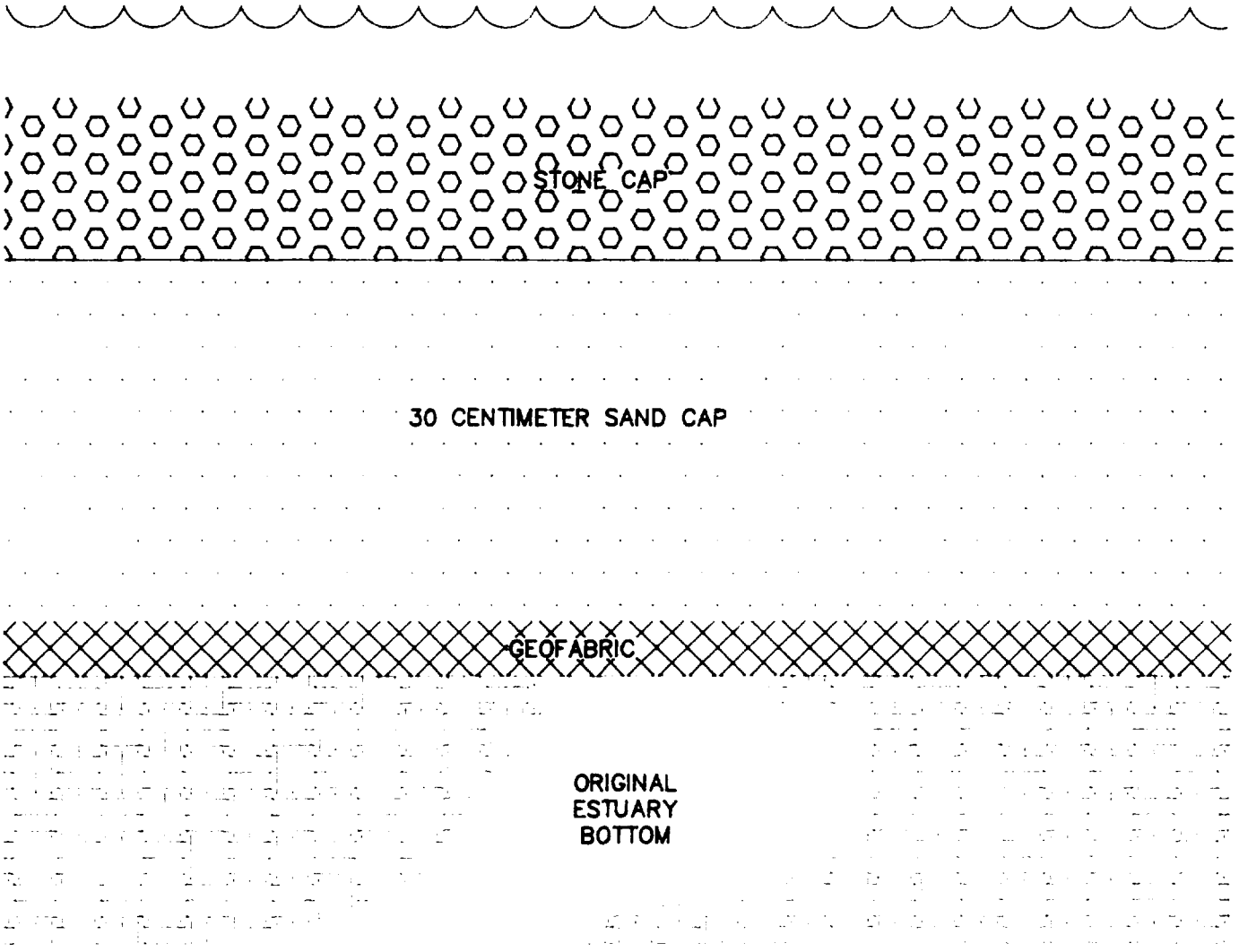
ch0003e

TYPICAL ARMORED CAP

CROSS SECTION



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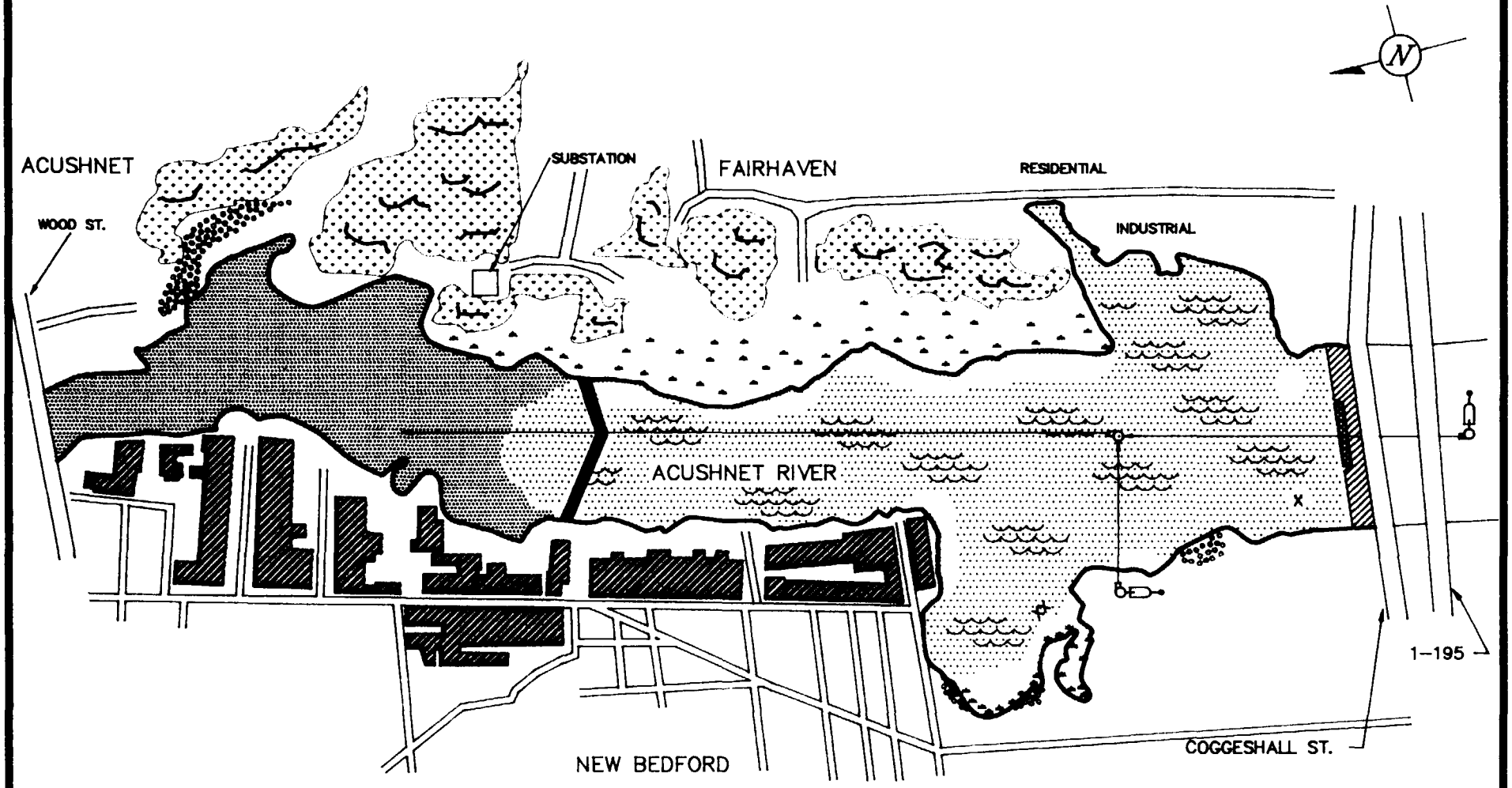

LEGEND

- = SALT MARSH
- = PHRAGMITES
- = TIDAL FLAT (MEAN LOW WATER-MEAN SEA LEVEL)
- = WATER COVERAGE (AT MEAN LOW WATER)
- X X = ROCKS
- = PLACED CAP MATERIAL
- = SEDIMENT TRAP
- = DREDGE AND PUMP

CAP PLACEMENT PROCESS

0' 500' 1000' 1500'

OH6002E 1"=900'

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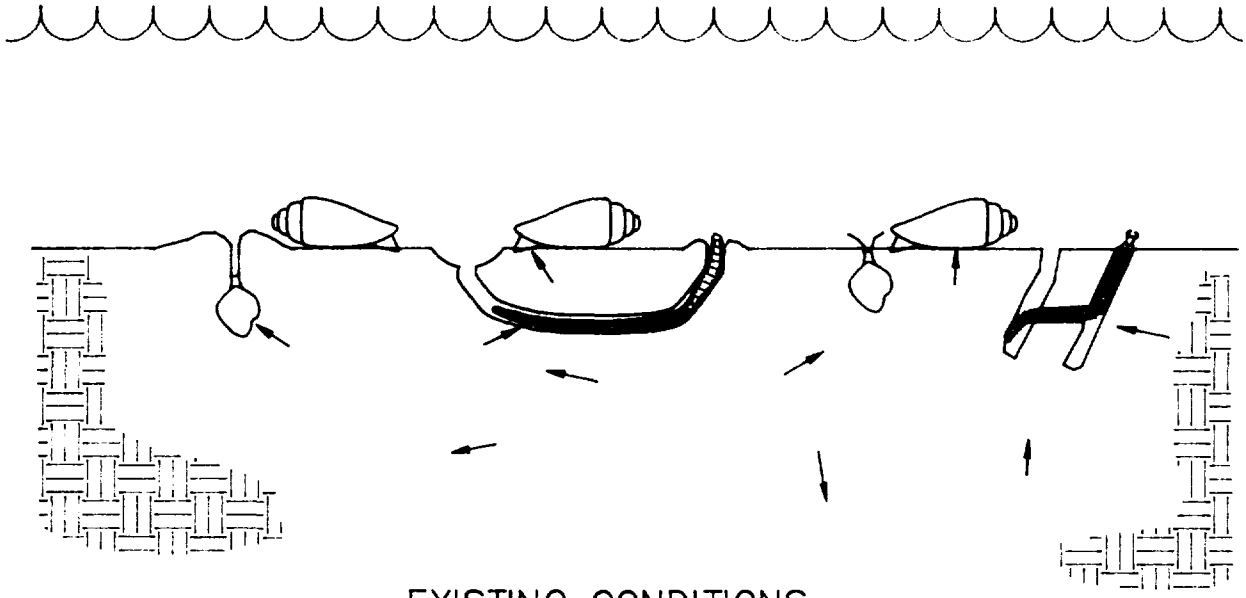
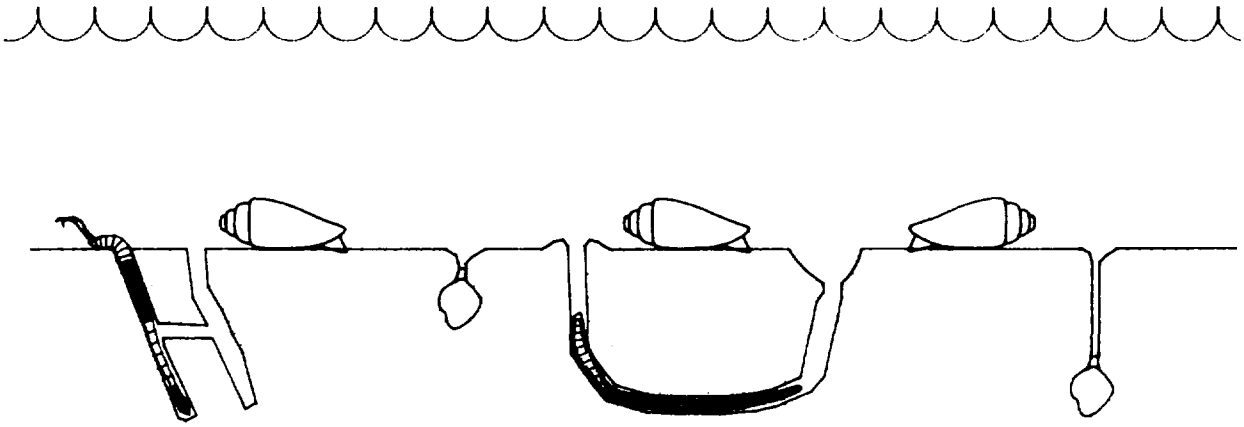
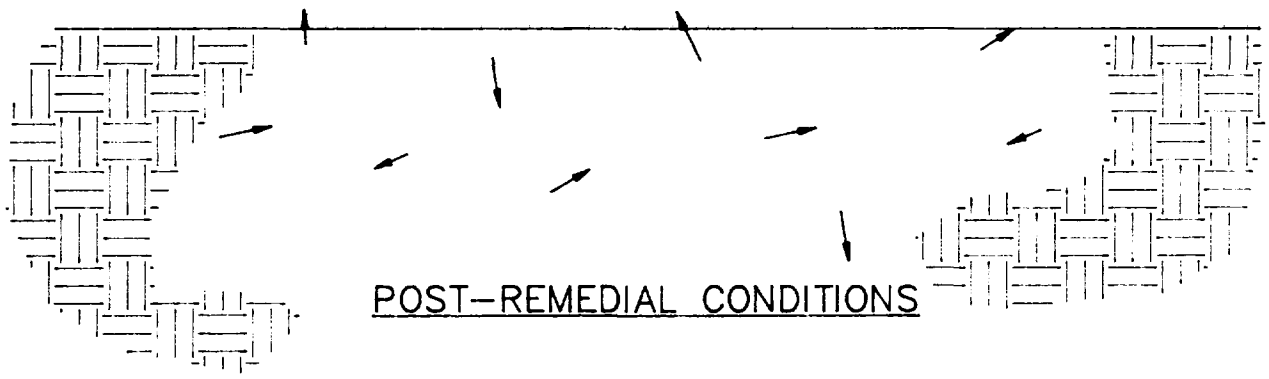


EXISTING CONDITIONS





POST-REMEDIAL CONDITIONS

CONTAMINANT MOVEMENT

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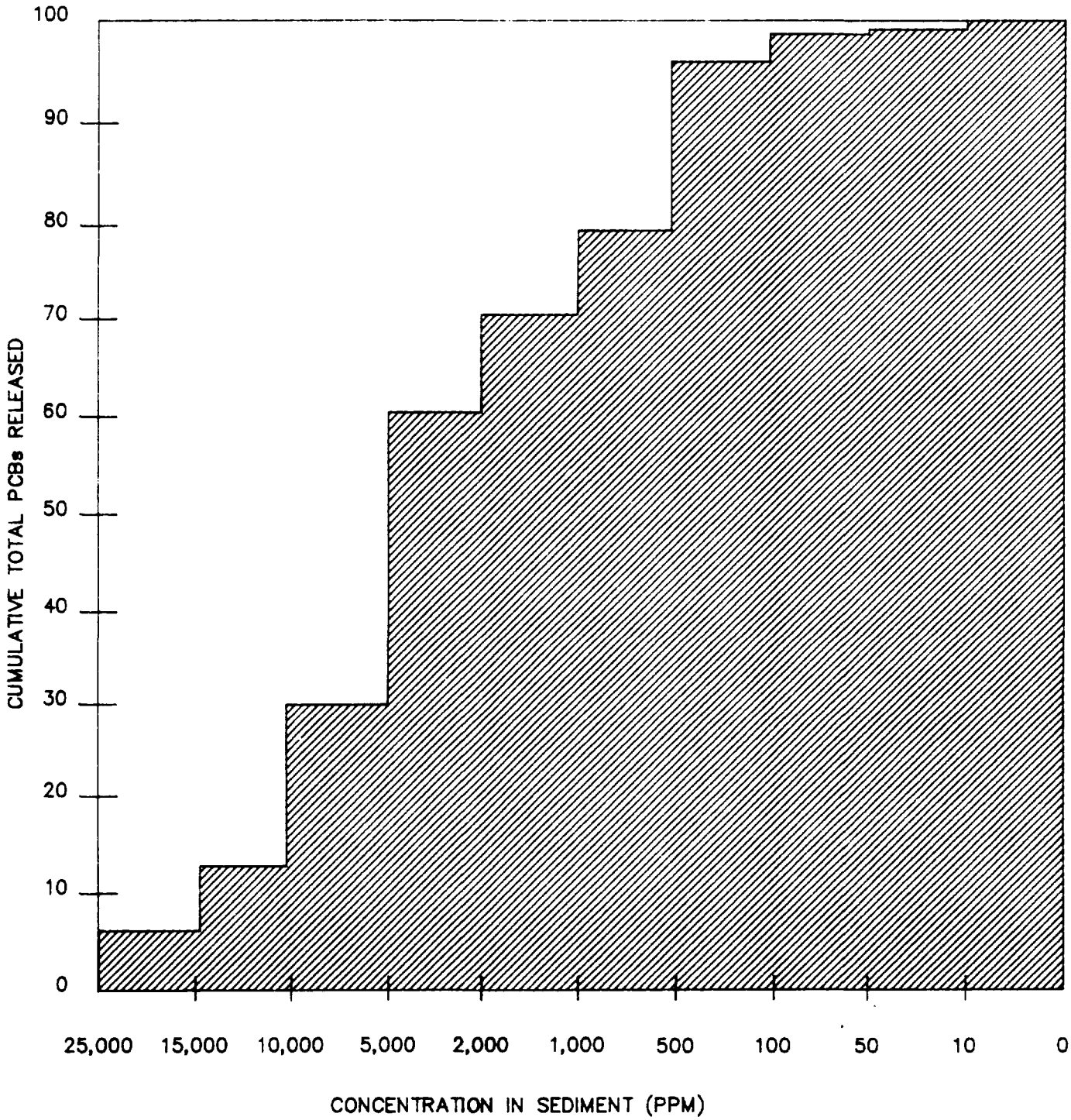
CUMULATIVE PERCENTAGE OF PCBs RELEASED FROM UPPER ESTUARY



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SUMMARY OF CAPPING EFFECTIVENESS

PRE-REMEDIAL PCB FLUX

PCB Concentration	Area	Percentage of PCB Flux
500 ppm and above	57 acres (30%)	78
100 ppm and above	110 acres (58%)	97
50 ppm and above	135 acres (69%)	99

POST-REMEDIAL PCB FLUX

PCB breakthrough sediment concentration - 0.2 ppm

PCB flux through cap - 1/2 pound per year

PERMANENCE OF CAP

HYDRODYNAMICS

- o TIDE DRIVEN
- o WIND DRIVEN
- o RIVER STORM FLOW
- o SURFACE WATER RUN-OFF

SEDIMENTARY REGIME

- o HIGHLY RESTRICTED CIRCULATION
- o NET DEPOSITIONAL AREA

PUBLIC ACTIVITY

- o SHELL FISHING
- o BEACH COMBING
- o ANCHORING
- o PROP WASH

REDUCTION OF SITE RISK

DIRECT SEDIMENT CONTACT - AREAS WITH ELEVATED PCB CONCENTRATIONS ARE CAPPED TO EFFECTIVELY PREVENT CONTACT BY HUMANS OR BIOTA

DIRECT WATER CONTACT - NO SIGNIFICANT RISK

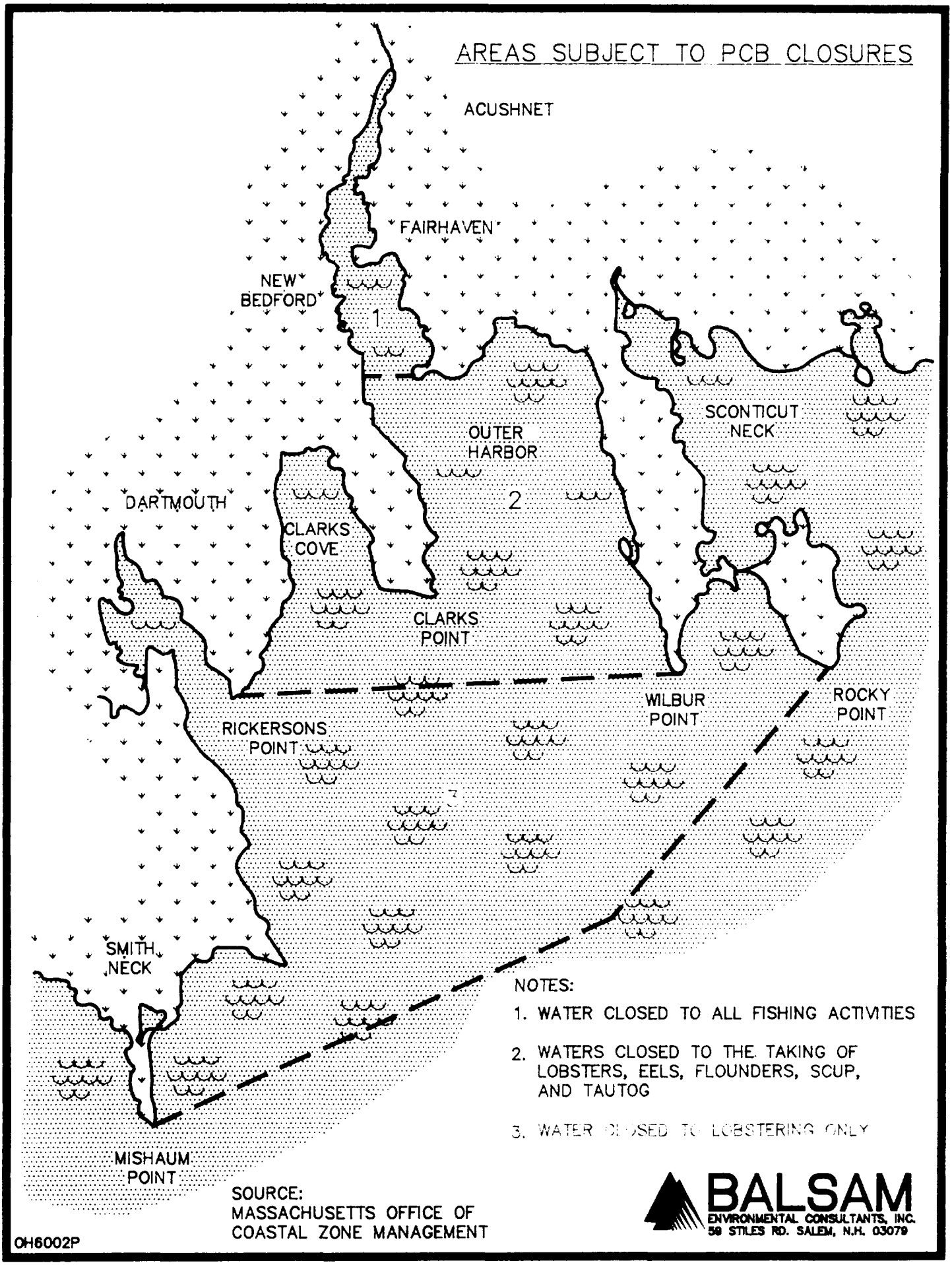
INHALATION - NO SIGNIFICANT RISK

CONSUMPTION OF BIOTA - 98% OF PCBs AND PCB FLUX FROM UPPER ESTUARY WILL BE ELIMINATED FROM ENTRY INTO FOOD CHAIN

FDA limit of 2ppm

PCB BODY BURDEN
NEW BEDFORD HARBOR AREA FISH

	Winter Flounder Flesh	Lobster Muscle	Lobster Liver
Closure Area 1	0.878 ppm	0.831 ppm	80.31 ppm
Closure Area 2	0.939 ppm	0.458 ppm	22.13 ppm
Closure Area 3	0.321 ppm	0.231 ppm	14.41 ppm
Area 4	0.242 ppm	0.06 ppm	3.69 ppm


AREAS SUBJECT TO PCB CLOSURES
ACUSHNET
FAIRHAVEN
NEW BEDFORD
1
OUTER HARBOR
2
SCONTICUT NECK
DARTMOUTH
CLARKS COVE
CLARKS POINT
WILBUR POINT
ROCKY POINT
RICKERSONS POINT
SMITH NECK
MISHAUM POINT
NOTES:
1. WATER CLOSED TO ALL FISHING ACTIVITIES
2. WATERS CLOSED TO THE TAKING OF LOBSTERS, EELS, FLOUNDERS, SCUP, AND TAUTOG
3. WATER CLOSED TO LOBSTERING ONLY
SOURCE:
MASSACHUSETTS OFFICE OF COASTAL ZONE MANAGEMENT
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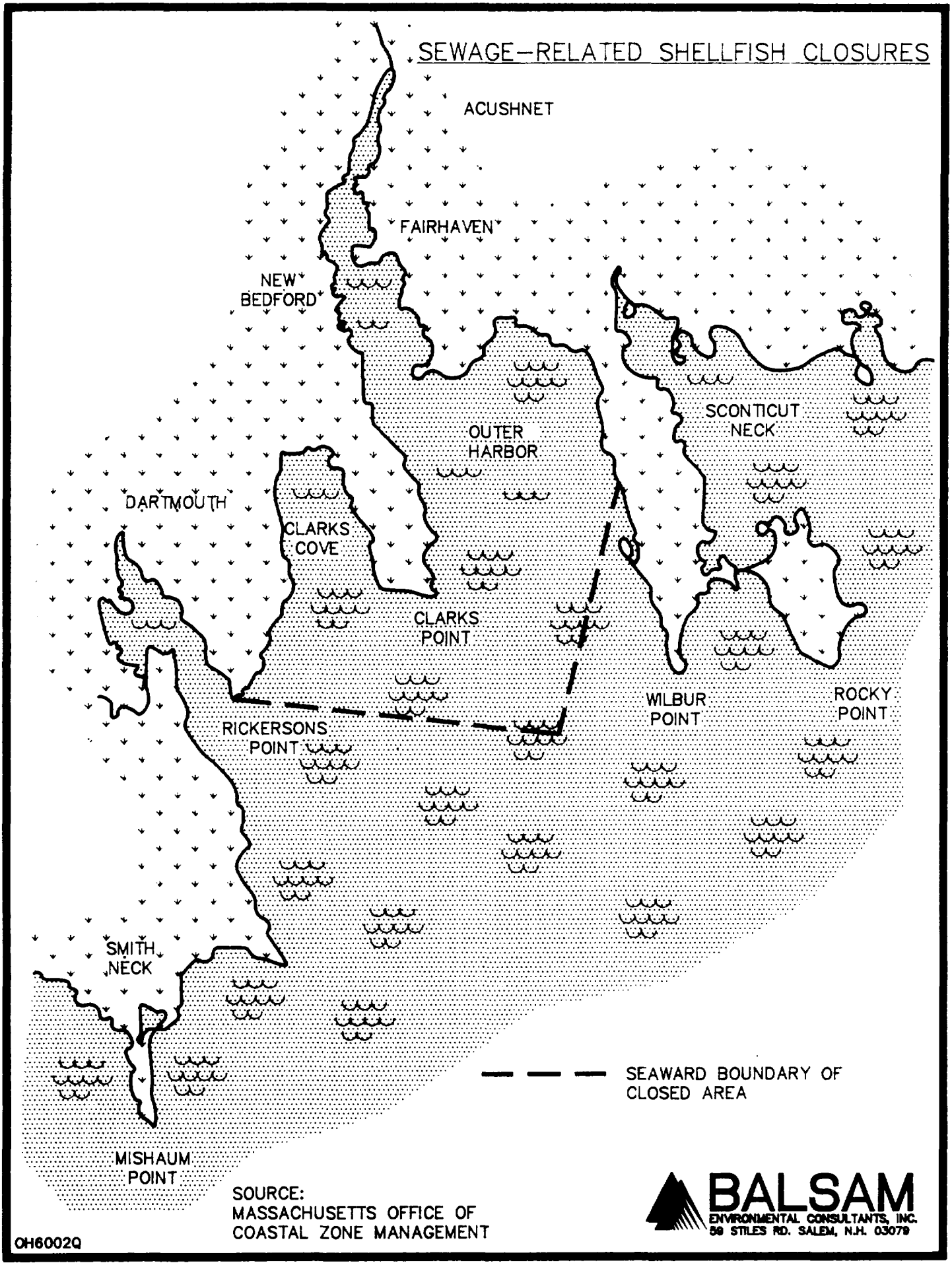
OH6002P


SEWAGE-RELATED SHELLFISH CLOSURES
ACUSHNET
FAIRHAVEN
NEW BEDFORD
OUTER HARBOR
SCONTICUT NECK
DARTMOUTH
CLARKS COVE
CLARKS POINT
WILBUR POINT
ROCKY POINT
RICKERSONS POINT
SMITH NECK
MISHAUM POINT
SEAWARD BOUNDARY OF CLOSED AREA
SOURCE:
MASSACHUSETTS OFFICE OF
COASTAL ZONE MANAGEMENT
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ENVIRONMENTAL CONSULTANTS, INC.
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OH6002Q

BIODEGRADATION OF PCBs

- BIODEGRADATION OF PCBs WELL ESTABLISHED IN THE LITERATURE
- EPA ACKNOWLEDGES PCB BIODEGRADATION IN NEW BEDFORD HARBOR SEDIMENTS
- IN-SITU PCB BIODEGRADATION HAS BEEN DEMONSTRATED AT SEVERAL OTHER SITES (SILVER LAKE, MA; HUDSON RIVER; WAUKEGAN HARBOR, MI)
- STUDIES OF NATURAL PCB BIODEGRADATION BY INDIGENOUS MICROBES HAVE BEEN PERFORMED FOR NEW BEDFORD HARBOR
- WORK BY DR. JOHN BROWN (1987) SHOWED EXTENSIVE PCB DEGRADATION THROUGHOUT HARBOR
- LABORATORY STUDIES BY DR. JAMES TIEDJE (IN PROGRESS) USING NEW BEDFORD HARBOR MICROBES SHOWED BIODEGRADATION PROCEEDING IN EIGHT WEEKS
- REVIEW OF NUMEROUS CHROMATOGRAMS FROM UPPER ESTUARY SAMPLES BY DR. ANNA YOAKUM (IN PROGRESS) SUPPORT DR. BROWN'S FINDINGS
- PCB BIODEGRADATION IS OCCURRING IN NEW BEDFORD HARBOR SEDIMENTS AND SHOULD CONTINUE AFTER CAPPING

MONITORING PROGRAM

- PHYSICAL SURVEY OF CAP (MONTHLY)

- SURFACE WATER SAMPLES AT THE COGGESHALL STREET BRIDGE (QUARTERLY)

- BIOTA SAMPLES FROM THE UPPER ESTUARY (QUARTERLY)

- CAP PROBES AND SEDIMENT CORES (QUARTERLY)

CAPPING ISSUES

- CAN IT BE BUILT?

- IS IT PERMANENT?

- CAN THE CAP BE BREACHED AND WHAT WOULD BE THE EFFECTS?

- ARE THERE SIGNIFICANT SHORT-TERM EFFECTS FROM IMPLEMENTATION?

- CAN CAPPING REMEDIATE THE "HOT SPOT"?

COST AND SCHEDULE

- COST ESTIMATED AT $15,000,000
- LITTLE ADDITIONAL FIELD WORK REQUIRED TO PROCEED TO FINAL DESIGN (1989)
- FINAL DESIGN AND BIDDING COULD BE COMPLETED NEXT YEAR (1989 TO 1990)
- FIELD PROGRAM IS EXPECTED TO TAKE LESS THAN TWO YEARS TO COMPLETE (1991 TO 1992)